

## CLAIMS

What is claimed is:

- 5 1. A method for matching a target color with a sample color, the method comprising the steps of:
- 10 A. generating a target identifier that identifies a target color in a device independent color space;
- 15 B. providing a set of color space distances based on (i) the target identifier and (ii) a set of sample identifiers that identifies a set of sample colors in the device independent color space, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each sample identifier includes a unique set of colors, and wherein the buffer area of the sample color area defined by each sample identifier is a same common color; and
- 20 C. selecting, from the set of sample identifiers, a particular sample identifier that identifies a particular sample color based on the set of color space distances, in order to match the target color with the particular sample color.
2. The method of claim 1, further comprising the steps of:
- 25 repeating steps A, B and C for other target colors in order to match multiple target colors to multiple sample colors identified by the set of sample identifiers; and
- creating a color lookup table having multiple entries that match the multiple target colors to the multiple sample colors.

3. The method of claim 1 wherein each color space distance is a sphere radius between the target color and one of the set of sample colors in the device independent color space, and wherein step C includes the step of:
- 5 choosing, as the particular sample identifier, a sample identifier that identifies a sample color that provides a shortest sphere radius between the target color and any of the set of sample colors in the device independent color space.
4. The method of claim 1 wherein step C includes the step of:
- 10 determining that multiple sample colors provide substantially the same shortest sphere radius; and
- choosing, from multiple sample identifiers that identify the multiple sample colors, a sample identifier that identifies a sample color that provides a closest hue plane to the target color in another device independent color space.
- 15 5. The method of claim 1 wherein step C includes the step of:
- obtaining, as the particular sample identifier, a data structure that defines (i) a JxK matrix of colored dots to form a core area, and (ii) multiple colored dots adjacent the JxK matrix to form a buffer area; wherein the core and buffer areas combine to form sample color area having an MxN matrix of dots; wherein J, K, M and N are integers; wherein J is less than M; and wherein K is less than N.
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6. A system for matching a target color with a sample color, comprising:  
a generator module that generates a target identifier which identifies a target color in a device independent color space;  
a distance module that provides a set of color space distances based on (i)  
5 the target identifier and (ii) a set of sample identifiers that identifies a set of sample colors in the device independent color space, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each sample identifier includes a unique set of colors, and wherein the buffer area of  
10 the sample color area defined by each sample identifier is a same common color; and  
a selector module that selects, from the set of sample identifiers, a particular sample identifier that identifies a particular sample color based on the set of color space distances, in order to match the target color with the particular  
15 sample color.
7. The system of claim 6, further comprising:  
a controller that (i) operates the generator, distance, and selector modules for other target colors in order to match multiple target colors to multiple sample  
20 colors identified by the set of sample identifiers, and (ii) creates a color lookup table having multiple entries that match the multiple target colors to the multiple sample colors.
8. The system of claim 6 wherein each color space distance is a sphere radius  
25 between the target color and one of the set of sample colors in the device independent color space; and wherein the selector module performs a selection routine that chooses, as the particular sample identifier, a sample identifier that identifies a sample color that provides a shortest sphere radius between the target color and any of the set of sample colors in the device independent color space.

9. The system of claim 6 wherein the selector module performs a selection routine that, when multiple sample colors provide substantially the same shortest sphere radius, chooses, from multiple sample identifiers that identify the multiple sample colors, a sample identifier that identifies a sample color that provides a closest hue plane to the target color in another device independent color space.
10. The system of claim 6 wherein the selection module is configured to obtain, as the particular sample identifier, a data structure that defines (i) a  $J \times K$  matrix of colored dots to form a core area, and (ii) multiple colored dots adjacent the  $J \times K$  matrix to form a buffer area; wherein the core and buffer areas combine to form sample color area having an  $M \times N$  matrix of dots; wherein  $J$ ,  $K$ ,  $M$  and  $N$  are integers; wherein  $J$  is less than  $M$ ; and wherein  $K$  is less than  $N$ .

1. A computer readable medium having instructions stored thereon for matching a target color with a sample color, such that the instructions, when carried out by a processor, cause the processor to perform the steps of:
- 5 A. generating a target identifier that identifies a target color in a device independent color space;
- B. providing a set of color space distances based on (i) the target identifier and (ii) a set of sample identifiers that identifies a set of sample colors in the device independent color space, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each
- 10 sample identifier includes a unique set of colors, and wherein the buffer area of the sample color area defined by each sample identifier is a same common color; and
- C. selecting, from the set of sample identifiers, a particular sample identifier that identifies a particular sample color based on the set of color space distances, in order to match the target color with the particular sample color.
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12. A method for providing an image having a sample color that matches a target color, the method comprising the steps of:
- A. generating a target identifier that identifies a target color;
  - B. from a set of sample identifiers and based on the target identifier, selecting a sample identifier that identifies a sample color in order to match the target color with the sample color, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each sample identifier includes a unique set of colors, and wherein the buffer area of the sample color area defined by each sample identifier is a same common color; and
  - C. outputting an image having the sample color area defined by the selected sample identifier.
13. The method of claim 12 wherein a color lookup table includes multiple entries, wherein each entry of the color lookup table includes a sample identifier of the set of sample identifiers, and wherein step B includes the step of:
- choosing an entry of the color lookup table based on the generated target identifier, the sample identifier of the chosen entry being the selected sample identifier that identifies the sample color that is matched to the target color.
14. The method of claim 12 wherein step B includes the step of:
- obtaining, as the selected sample identifier, a data structure that defines (i) a JxK matrix of colored dots to form a core area, and (ii) multiple colored dots adjacent the JxK matrix to form a buffer area; wherein the core and buffer areas combine to form sample color area having an MxN matrix of dots; wherein J, K, M and N are integers; wherein J is less than M; and wherein K is less than N.

15. The method of claim 12, further comprising the steps of:

determining, for a region of another target color, that the other target color does not match any of the set of sample colors within a predetermined color distance in the device independent color space; and

5 from the set of sample identifiers and in a pseudo-random manner, selecting multiple sample identifiers that identify different sample colors in order to match the region of the other target color with the different sample colors identified by the multiple sample identifiers in an alternating manner.

10 16. A system for providing an image having a sample color that matches a target color, comprising:

a generator module that generates a target identifier that identifies a target color;

15 a selector module that selects, from a set of sample identifiers and based on the target identifier, a sample identifier that identifies a sample color in order to match the target color with the sample color, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each sample identifier includes a unique set of colors, and wherein the buffer area of the sample color area defined by each sample identifier is a same common color; and

20 an output device that outputs an image having the sample color area defined by the selected sample identifier.

17. The system of claim 16, further comprising:

memory that stores a color lookup table having multiple entries, wherein each entry of the color lookup table includes a sample identifier of the set of sample identifiers, and wherein the selector module is configured to choose an entry of the color lookup table based on the generated target identifier, the sample identifier of the chosen entry being the selected sample identifier that identifies the sample color that is matched to the target color.

18. The system of claim 16 wherein the selector module is configured to obtain, as the selected sample identifier, a data structure that defines (i) a  $J \times K$  matrix of colored dots to form a core area, and (ii) multiple colored dots adjacent the  $J \times K$  matrix to form a buffer area; wherein the core and buffer areas combine to form sample color area having an  $M \times N$  matrix of dots; wherein  $J$ ,  $K$ ,  $M$  and  $N$  are integers; wherein  $J$  is less than  $M$ ; and wherein  $K$  is less than  $N$ .

19. The system of claim 16, further comprising:

a controller that selects, from the set of sample identifiers and in a pseudo-random manner, multiple sample identifiers that identify different sample colors in order to match the region of the other target color with the different sample colors identified by the multiple sample identifiers in an alternating manner when the controller determines that, for a region of another target color, that the other target color does not match any of the set of sample colors within a predetermined color distance in the device independent color space.



20. A computer readable medium having instructions stored thereon for providing an image having a sample color that matches a target color, such that the instructions, when carried out by a processor, cause the processor to perform the steps of:
- 5 A. generating a target identifier that identifies a target color;
- B. from a set of sample identifiers and based on the target identifier, selecting a sample identifier that identifies a sample color in order to match the target color with the sample color, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each
- 10 sample identifier includes a unique set of colors, and wherein the buffer area of the sample color area defined by each sample identifier is a same common color; and
- C. outputting an image having the sample color area defined by the selected sample identifier.

21. A method for ranking a set of sample colors relative to a target color, the method comprising the steps of:
- A. generating a target identifier that identifies a target color in a device independent color space;
- 5 B. providing a set of color space distances based on the target identifier and a set of sample identifiers that identifies a set of sample colors in the device independent color space, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each sample identifier includes a unique set of colors, and wherein the buffer area of
- 10 the sample color area defined by each sample identifier is a same common color; and
- C. based on the set of color space distances, ordering sample identifiers of the set of sample identifiers in order to rank the sample colors identified by
- 15 the sample identifiers relative to the target color.

~~2/2.~~ A system for ranking a set of sample colors relative to a target color, the system comprising:

a generator module that generates a target identifier that identifies a target color in a device independent color space;

5 a distance module that provides a set of color space distances based on the target identifier and a set of sample identifiers that identifies a set of sample colors in the device independent color space, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each sample identifier includes a unique set of colors, and wherein the buffer area of the sample color area defined by each sample identifier is a same common color; and

an ordering module that orders, based on the set of color space distances, sample identifiers of the set of sample identifiers in order to rank the sample colors identified by the sample identifiers relative to the target color.

23.

A computer readable medium having instructions stored thereon for ranking a set of sample colors relative to a target color, such that the instructions, when carried out by a processor, cause the processor to perform the steps of:

A. generating a target identifier that identifies a target color in a device independent color space;

B. providing a set of color space distances based on the target identifier and a set of sample identifiers that identifies a set of sample colors in the device independent color space, wherein each sample identifier defines a sample color area having a core area and a buffer area adjacent the core area, wherein the core area of the sample color area defined by each sample identifier includes a unique set of colors, and wherein the buffer area of the sample color area defined by each sample identifier is a same common color; and

C. based on the set of color space distances, ordering sample identifiers of the set of sample identifiers in order to rank the sample colors identified by the sample identifiers relative to the target color.